2007

Pesticide Safety 2007 - Pesticide Safety and PPE 2007

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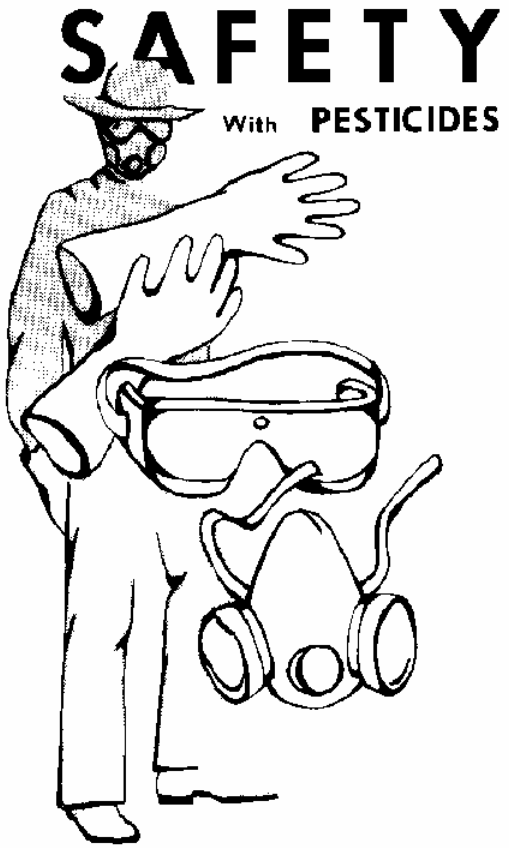
Pesticide Safety 2007



Marty Sylvia

UMass Extension

Cranberry Station

New Pesticide Frontiers

Pesticide Update

- Bayer, Dupont, Dow Agro, Syngenta
- UPI bought Cerexagri
- Gowan (not BASF) owns Nexter

  Nexter = Pyramite

- Guthion - Cancelled

  DO NOT USE

- Diazinon 14G Special Local Needs

  Available 2007 and 2008



Bayer CropScience

New Pesticide Frontiers

Pesticide Update

- Kerb Section 18 pending
  - Cleared MDAR, at EPA
  - Streamlined application
  - Hopefully by the end of the month
- Avaunt Section 18 possibility
  - EPA office requested a "detailed substantiation" of the emergency situation



Bayer CropScience

New fungicide available

Indar 75WSP

for fruit rot and fairy ring management

Fenbuconazole
Dow AgroSciences

Thanks to Frank Caruso

Fruit rot management

- 2-4 oz. per acre
- Begin applications prior to bloom at the onset of disease
- Continue on a 7-14 day spray schedule, depending on local conditions
- Do not make more than four applications or apply more than 16 oz. per acre per year
- 30 day PHI

Thanks to Frank Caruso

Fairy ring management

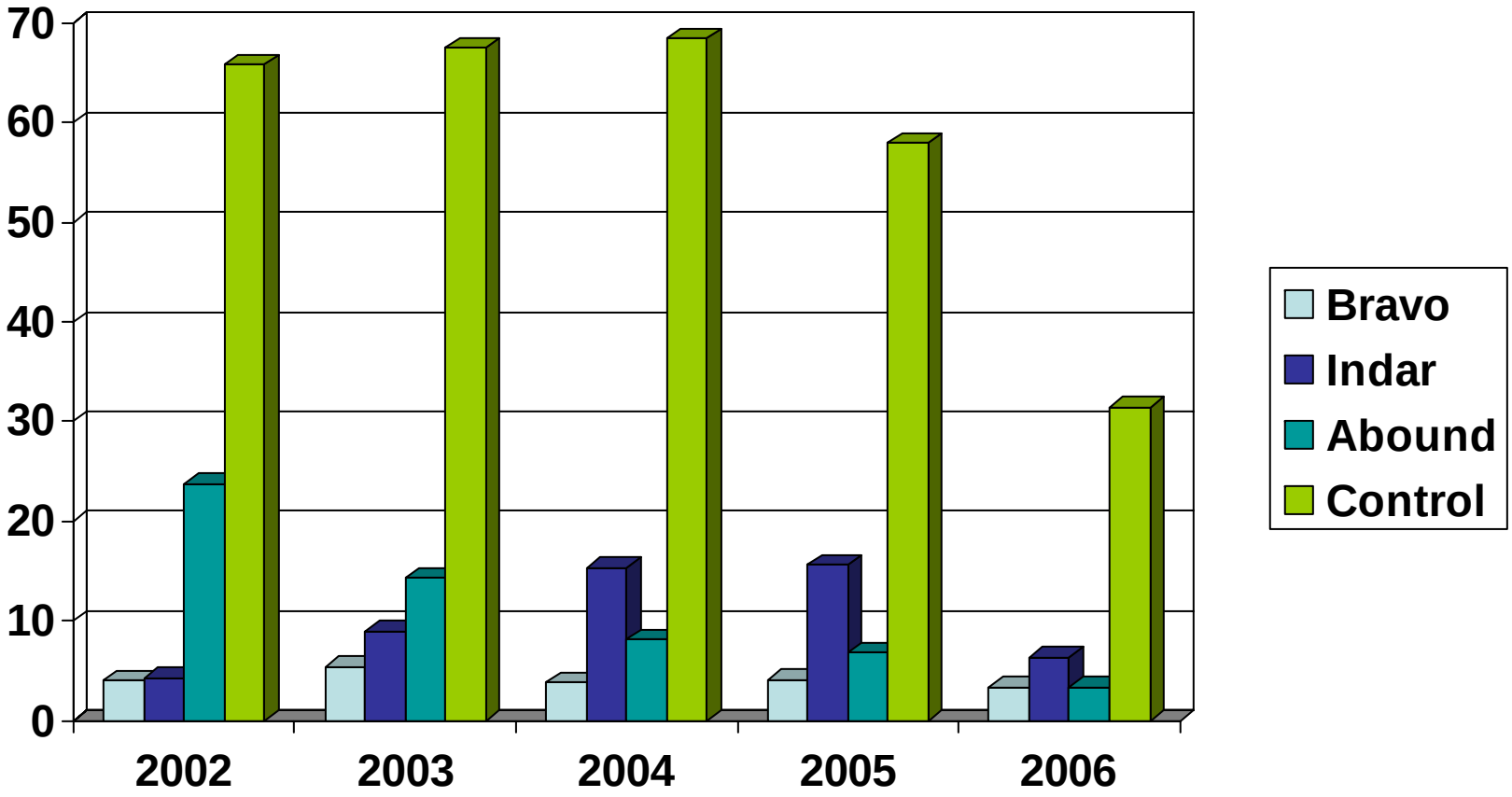
- Measure ring diameter and add 10 feet to the diameter
- Begin applications at budbreak and repeat once, if necessary, 14 days later
- Apply (4 oz./acre) in 30-100 gallons of water to the affected area
- Irrigation for 1-2 hr following application is advisable to ensure penetration to the base of the plant

Thanks to Frank Caruso

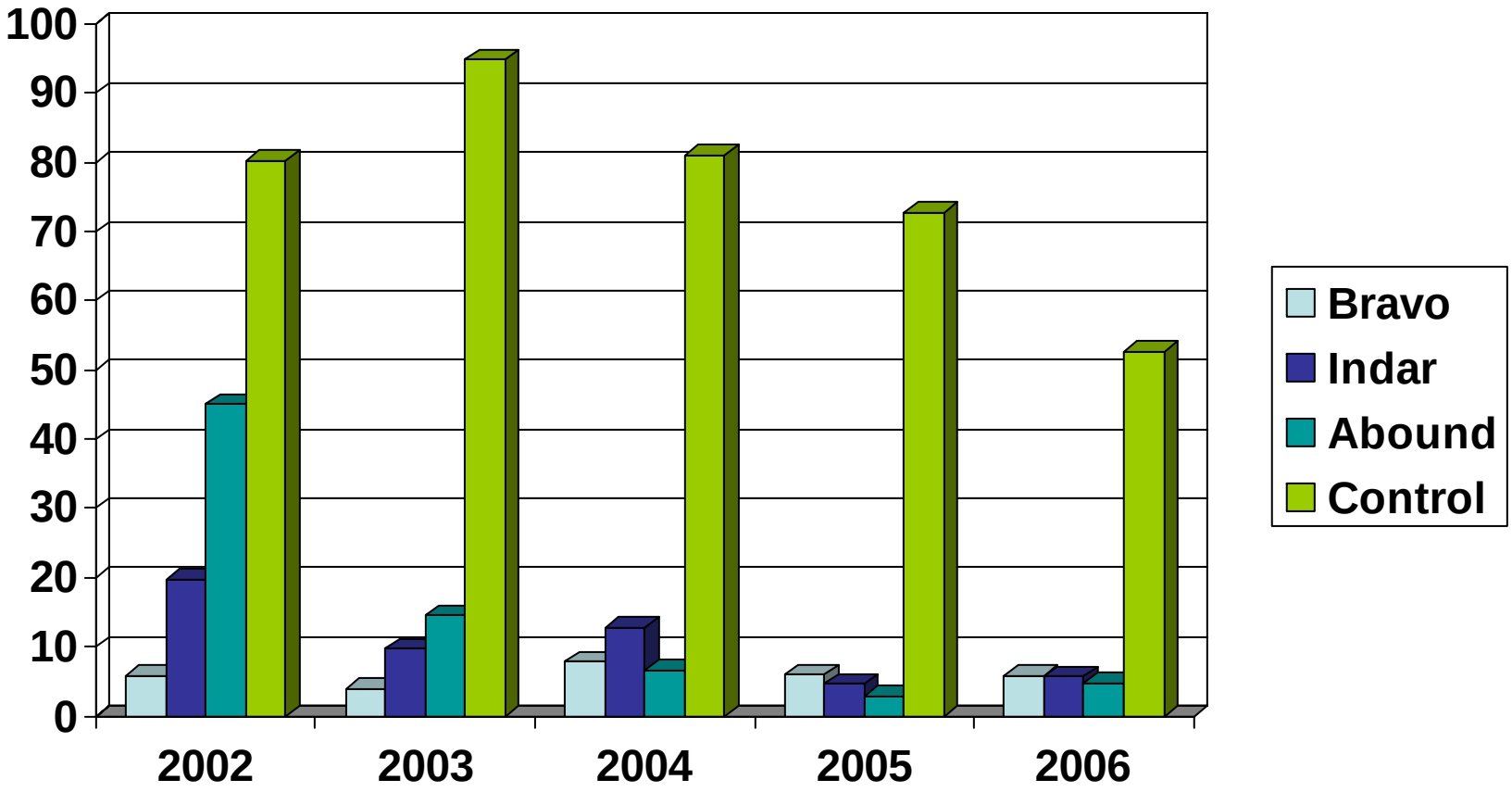
Resistance management

- Indar 75WSP belongs to the demethylation inhibitor (DMI), sterol-inhibiting class of fungicides (Classified “Group-3-Fungicide” by EPA).
- Some fungi can develop resistance to this class of products, so use Indar 75WSP as part of a resistance management strategy
- Alternate with fungicides of different modes of action.

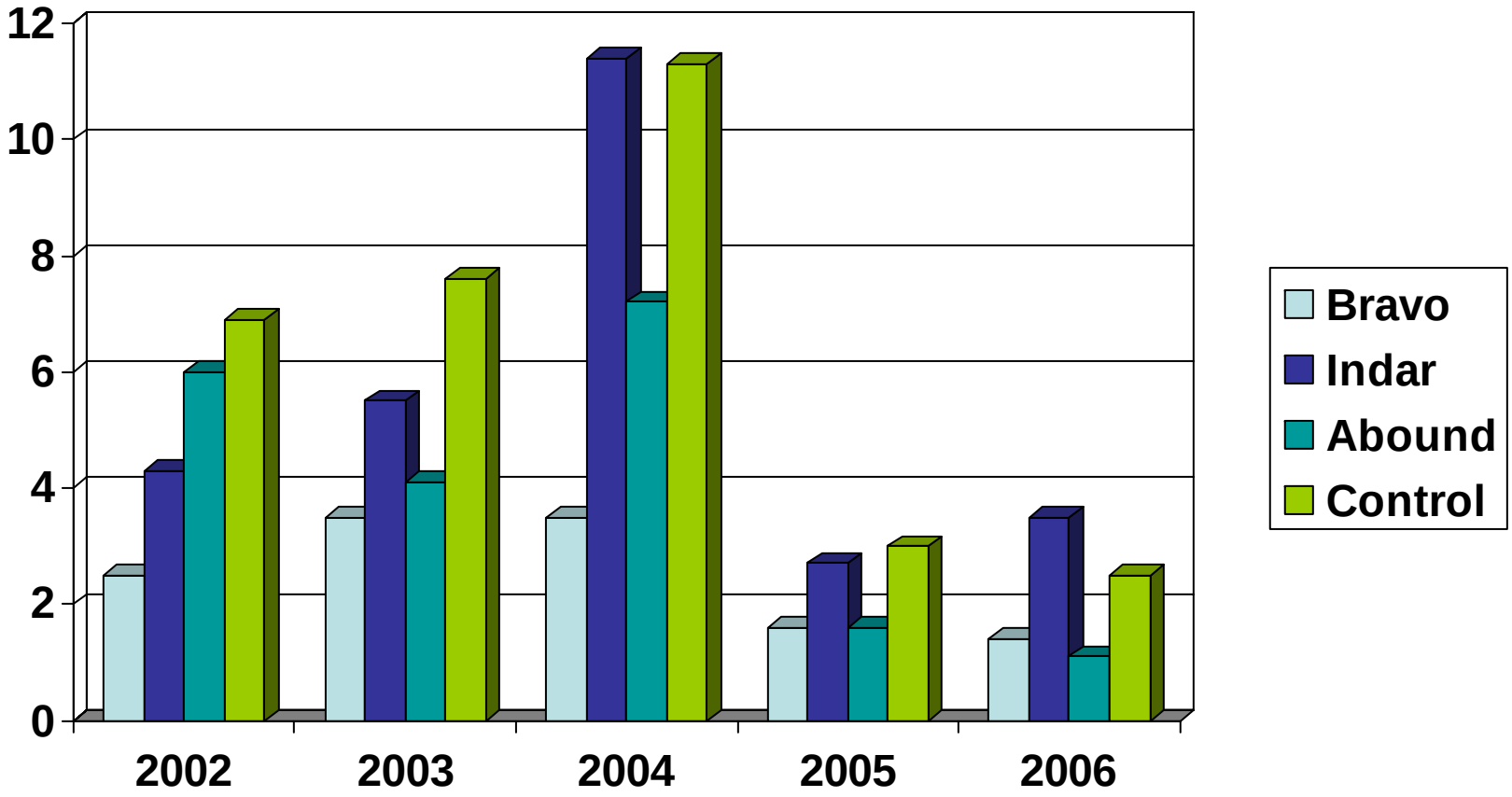
Field rot – Crowley



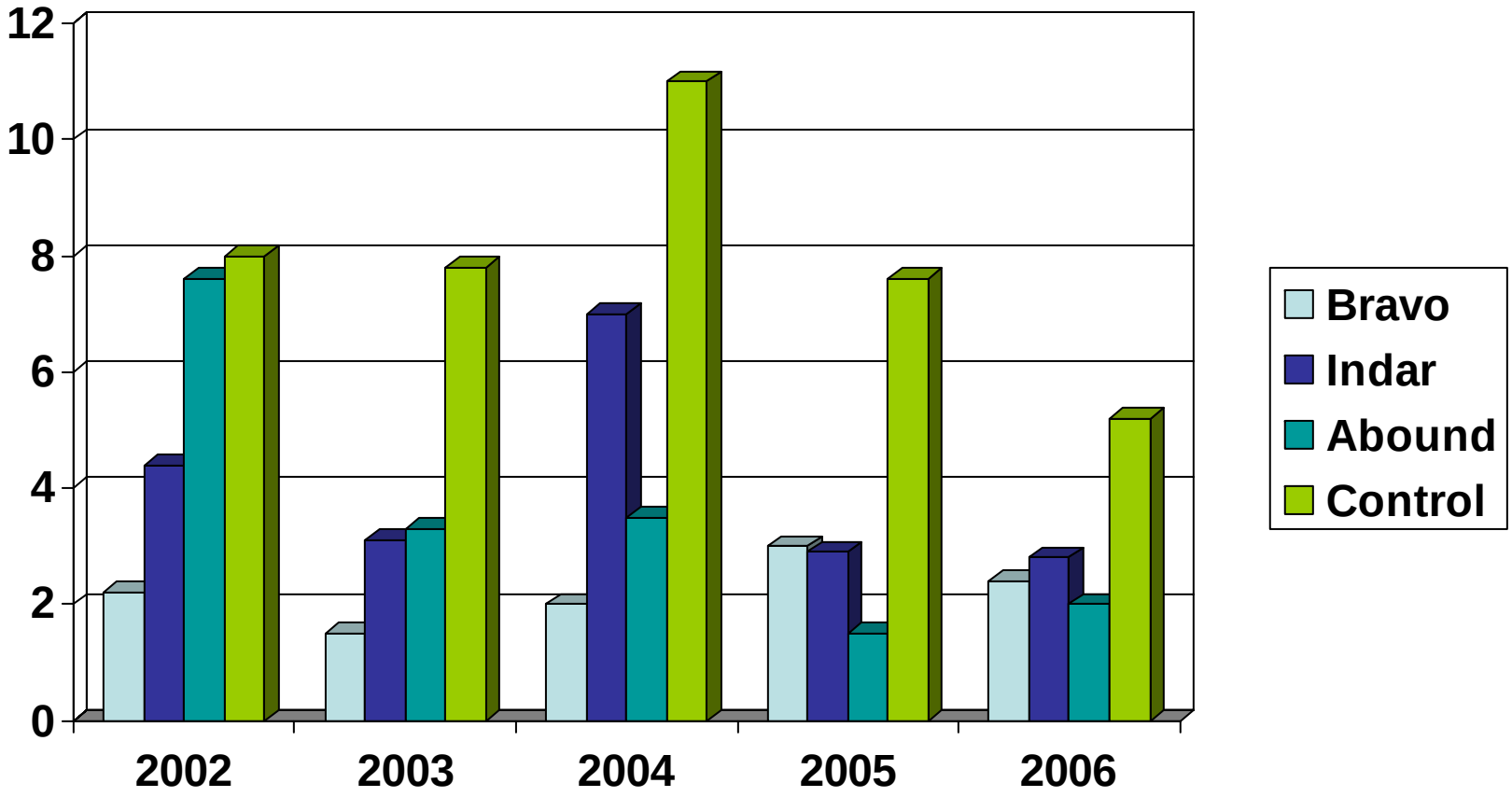
Field rot – Early Black



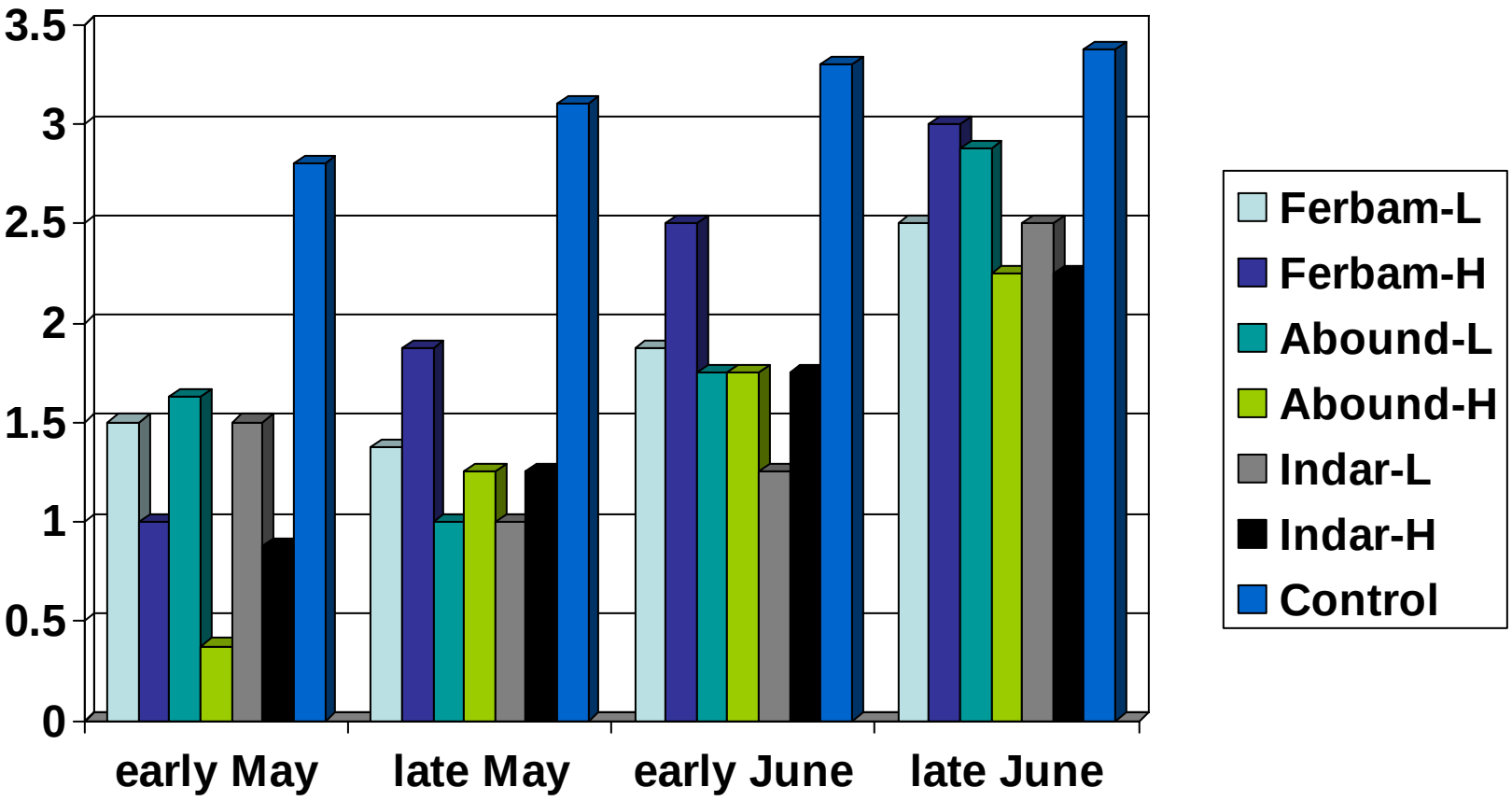
Storage rot – Crowley



Storage rot – Early Black



Fairy ring trial – Howes – 2002



Keeping Quality Forecast 2007

- Sunshine from previous crop year – 4 — 0
- Sunshine in February – 1 — 0
- Sunshine in March – 2 — maybe 2
- Temperature in March – 2 — 0
- Precipitation in March – 1 — 0

10 pts for Prelim.

- Temperature in April – 2
- Precipitation in April – 1
- Temperature in May – 2
- Precipitation in May – 1

16 pts for Final

How to Keep Safe

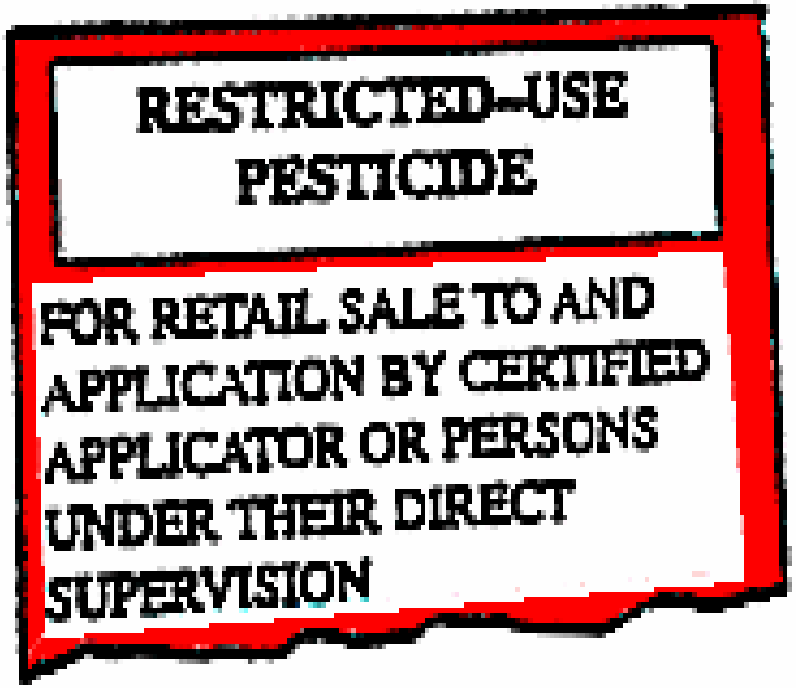
- Reduce Your Risk
- Know the Products
- Safety Practices
- Personal Protective Equipment

Reduce Your Risk

- Read the label
- Wear at least the PPE that is recommended
  - Protect what the label tells you to protect (eyes, lungs…)
- Use common sense
- Don’t be lazy!

Restricted Use Pesticides

- Not all restricted use pesticides are because of human toxicity.
- Know which ones are!!



Restricted Use Pesticides

- Diazinon
- Lorsban

Groundwater Protection/Zone II Problems

"the ability to leach through the soil"

- Chlorothalonil
  - (Bravo, Echo, Equus)
- Actara
- Intrepid
- Kerb
- Simazine
  - (Princep, Caliber)

Reduced risk pesticide products

- Biologicals or non-chemical alternatives
- low toxicity compounds
- low rate products

Reduced risk handling systems

- formulations and packaging eliminate handling
- containers reduce spills and accidents

Reduced risk pesticide products

Conventional reduced-risk pesticides have one or more of the following advantages over existing products:

- low impact on human health
- low toxicity to non-target organisms (birds, fish, and plants)
- low potential for groundwater contamination
- lower use rates
- low pest resistance potential

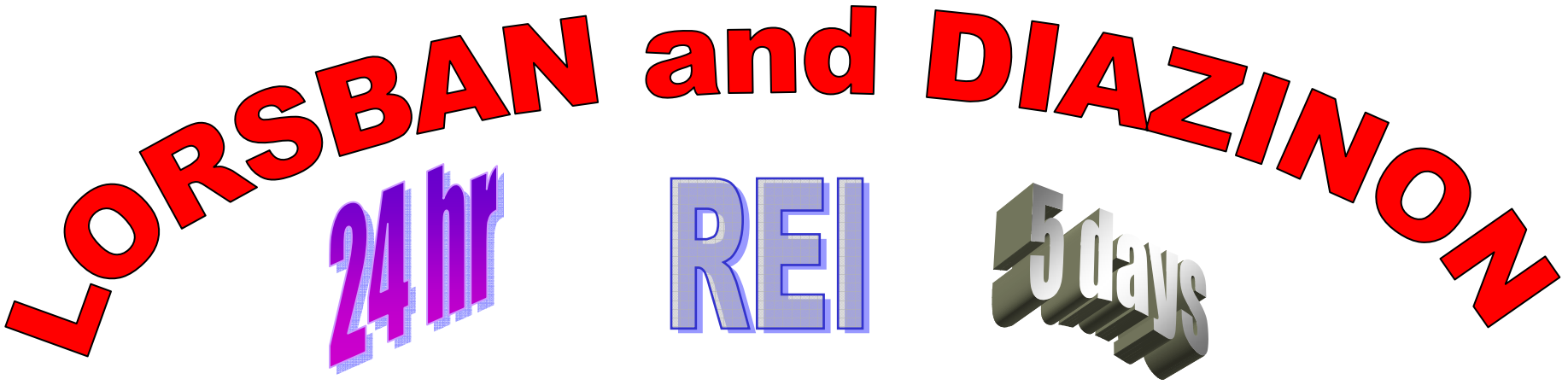
    - and compatibility with Integrated Pest Management.

LORSBAN and DIAZINON

When handling the concentrate…

- Coveralls over shirt and pants
- Chemical resistant gloves
- Chemical resistant apron
- Chemical resistant footwear plus socks
- Chemical resistant headgear for overhead exposure
- A NIOSH-approved pesticide respirator. (TC-21C or organic vapor-removing R, P or HE)

LORSBAN and DIAZINON



Early Entry…

- Coveralls over shirt and pants
- Chemical resistant gloves
- Chemical resistant footwear plus socks
- Chemical resistant headgear for overhead exposure

LORSBAN and DIAZINON

During application, while repairing or cleaning equipment, or during reentry before the REI is up..

- Wear a protective suit that covers all parts of the body except head, hands, and feet. Wear chemical resistant gloves, chemical resistant apron, and chemical resistant shoes or boots. Wear goggles or a face shield.

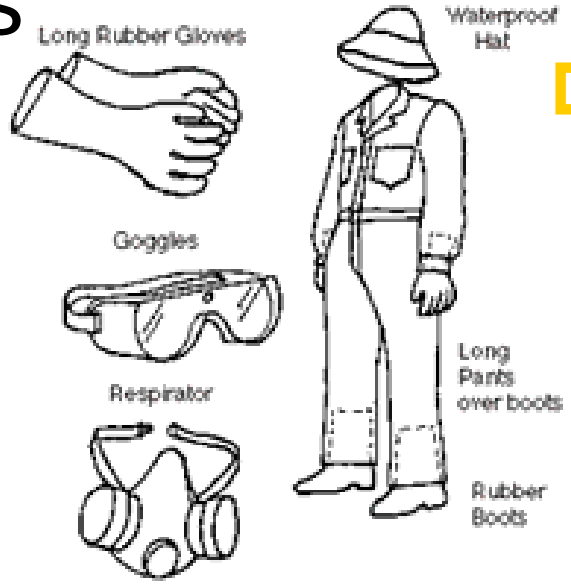
Personal Protective Equipment

PPE

still the best way to reduce exposure
and reduce your risk!

Personal Protection Equipment

- Coveralls
- Boots
- Gloves
- Hat



- Eyewear
- Respirator
- Apron

Personal Protective Equipment

- Must be provided by employer

  "Companies are required to make available to all workers whatever protective equipment is required for handling the chemicals they use"

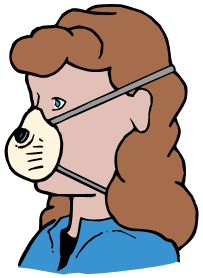
- PPE should be identified
- Training should be provided
- Company should implement and enforce PPE program

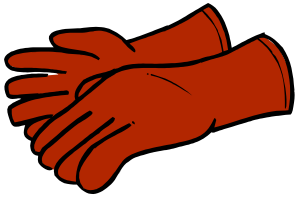
Chemical Resistant Categories

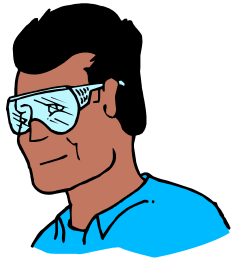
- HIGH:
  - Highly chemical-resistant
  - Can be used all day
- MODERATE:
  - Moderately chemical-resistant
  - Good for an hour or 2 of exposure
- SLIGHT:
  - Slightly chemical-resistant
  - Good for 10 minutes of exposure
- NONE:
  - No chemical-resistance
  - DO not use when pesticide contact is possible

Availability

- Gemplers
- RASP
- DECRAN
- RF MORSE





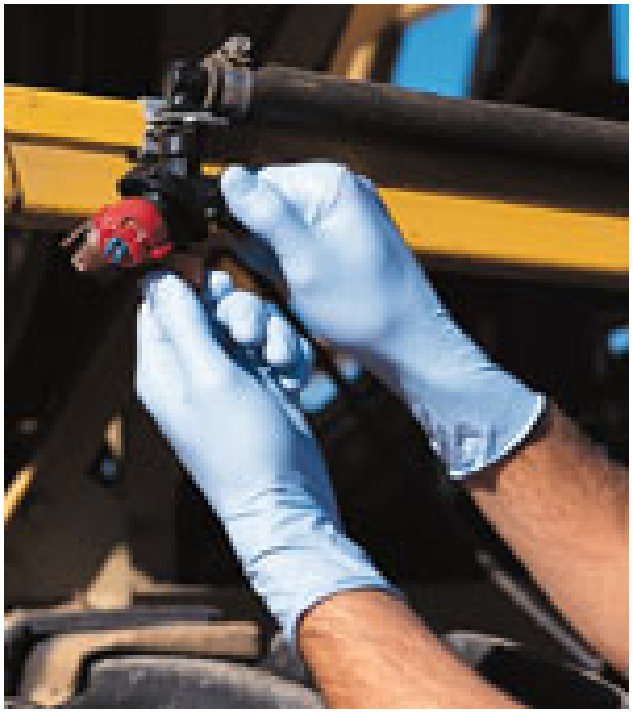


CLOTHING/COVERALLS

- Longsleeved shirt and pants
  - Woven or Nonwoven long sleeved shirt and long legged pants
  - EVERY pesticide label requires long pants and long shirt!!
- Coverall over shirt and pants
  - Always provide more protection
  - Disposable coveralls are a good idea for pesticide use
- Chemical resistant protective suit
  - Rubber, plastic, barrier coated
- Waterproof suit

GLOVES

- Chemically Resistant
  - Nitrile Rubber
  - Butyl Rubber
  - Neoprene Rubber
  - ~~Natural Rubber~~
  - ~~Polyethylene~~
  - ~~PVC~~
  - Viton
  - Barrier Laminate



Disposable Nitrile gloves

FOOTWEAR

- Shoes - ~~Leather, Canvas, Fabric~~

- Chemical Resistant Footwear or Boots:
  - Chemical Resistant Shoes
  - Chemical Resistant Boots
  - Chemical Resistant Shoe Covering

BOOTS

PVC BOOTS

VINYL BOOTS

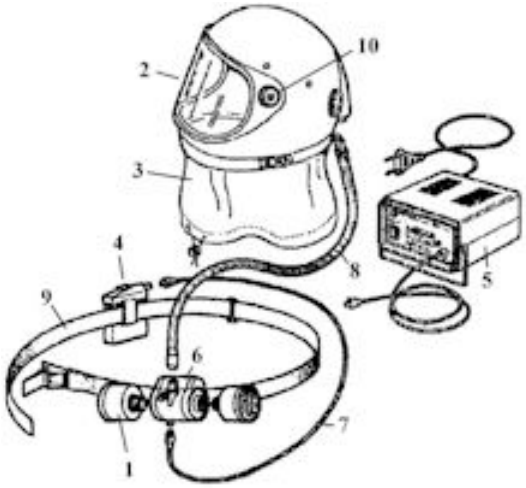
EYEWEAR

- Protective Eyewear
  - Shielded Safety Glasses
  - Face Shield
  - Goggles
  - Full Face style respirator

Respirators

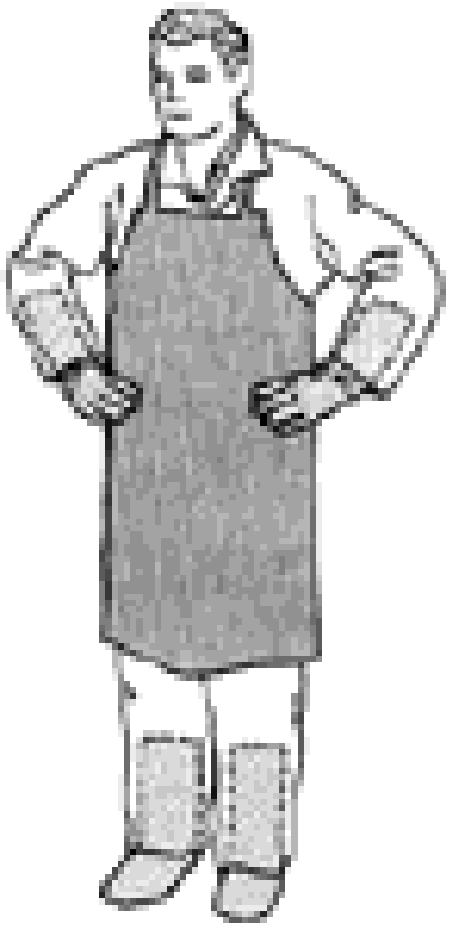
MUST HAVE NIOSH/MSHA APPROVAL

- Dust/mist filtering - dusts, powders, mists, and sprays. TC-21C
- Vapor removing - gases and vapors.
  - TC-23C - cartridge for organic vapors + prefilter
  - TC-14G - canister for pesticides/organic vapors



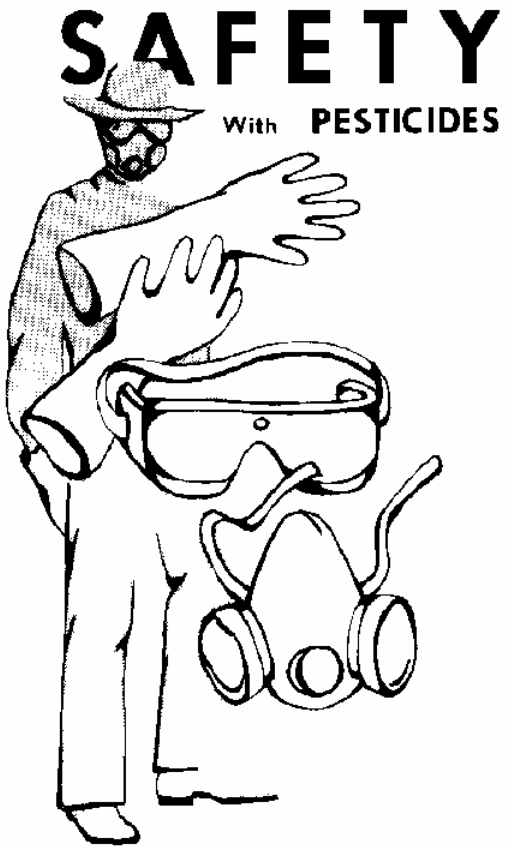
Extra Protection

- Apron
  - Chemical resistant
- Hat or Hood
  - Chemical resistant
  - Full hood as part of respirator
  - Not ball cap used all season



Clean Equipment!!

- Protective equipment should be cleaned *after every use.*
- Soap and water!!
- Dispose of heavily contaminated PPE



Storage

- Keep chemicals in original containers and tightly sealed.

Recommendation for Storage

- Glass bottles should be stored within a metal can, like a coffee can. If the bottle breaks, the spill will be contained.
- Be sure that caps are tightened securely on all bottles and cans.
- Eliminate leaky containers.
- Above all, keep pesticide materials in a locked room or cabinet and out of reach of children and animals.

Recommendation for Storage

- Store wettable powders, dusts and granules of pesticide products in a cool, dry place.
- Keep temperatures below 100 degrees F.
- Do not allow liquids to freeze
  - (glass containers could break).

Recommendation for Storage

- Do not store weed killers close to other materials (such as wettable powders, dust formulations or granular insecticides).

- Some weed killers such as 2,4-d and 2,4,5-t are highly volatile and can contaminate other materials (especially when confined in close quarters).

Storage

- It is not recommended to store pesticides longer than two years.
- Always purchase pesticides in a container size small enough to be used up within a season or less.
- Reduce storage problems.

Knowing More About Pesticides

Basic Toxicology

Absorbing Pesticides

Organophosphates

Half life

Basic Toxicology

Toxic means poisonous, harmful to living things.

Toxicity is having the quality of being poisonous; having harmful effects.

Kinds of Toxicity:

ACUTE

- how poisonous after a single short term exposure
- response during or soon after exposure
  - generally reversible

CHRONIC

- delayed poisonous effect after exposure
- continuous or occasional exposures over at least 3 month
  - generally irreversible

Definitions: Chronic Effects

- Carcinogens:
  - Cause cancer
- Mutagens:
  - Cause mutations in an organism's genetic material
- Teratogens:
  - cause birth defects in offspring following exposure of a pregnant female
- Oncogenicity:
  - Cause tumors

Restricted Use Pesticides

- Diazinon
- Lorsban

- Kerb
- Chlorothalonil
  - (Bravo, Echo, Equus)
- Actara
- Simazine
  - (Princep, Caliber)

Toxicity Measure: LD_{50}

The LD_{50} is the dose of toxin that produces 50% mortality in a test population.

The more toxic a material is, the less it takes to kill or produce a harmful effect.

Therefore, the lower the LD_{50} value, the more toxic the substance.

Sample Oral Toxicity Values

for Commonly-Used Cranberry Insecticides:

Pesticide (Product)	Acute Oral LD_{50} (mg/kg - male rat)	
parathion (Parathion)	3.6 - 13	
Danger		
azinphos-methyl (Guthion)	55 - 75	
chlorpyrifos (Lorsban)	135 – 163	
Warning		
diazinon (DZN Diazinon)	300 - 400	
carbaryl (Sevin)	850	
acephate (Orthene)	945	Caution

Toxicity Information and Clues:

- Concentration of Active Ingredient
- PPE Requirements
- Re-Entry Interval (REI)
- Label Signal Word
  (Danger, Warning, Caution)

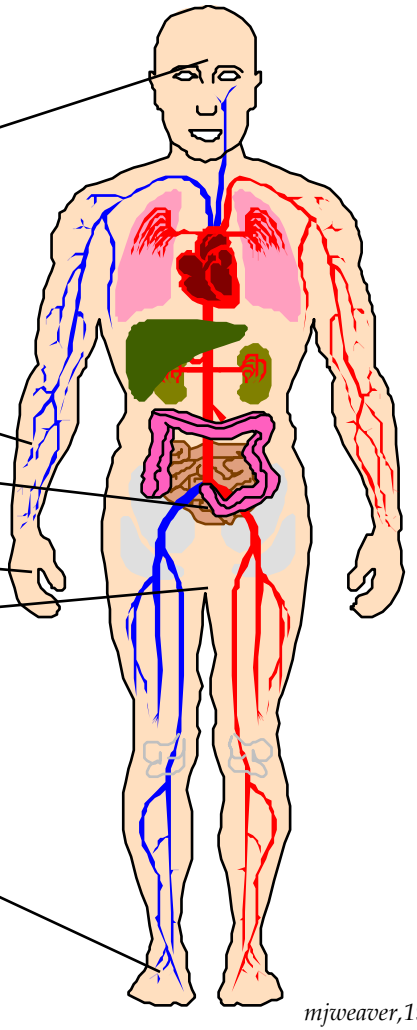
Dermal Exposure

If a pesticide is spilled on someone's skin, you should immediately rinse with plenty of water.

- Penetrants and oils may allow faster movement through the skin.
- Cuts and abrasions allow faster absorption.
- Eyes, ears, scalp or groin absorb fastest

Dermal Exposure Variables

Area	Rate*
forehead	4.2
forearm	1.0
abdomen	2.1
palm	1.3
scrotum	11.8
ball of foot	1.8



mjweaver,1997

*Absorption rate compared to forearm, which is 1.0

Routes of Entry:

Oral = Ingestion by mouth

Dermal = Skin exposure

Inhalation = Absorbed by lungs

the lungs have thin walls to allow oxygen to be taken into the blood stream, thus inhaled pesticides would enter the blood stream rapidly

Organophosphates

Lorsban*
(Chlorpyrifos)

Diazinon*

Orthene
(Acephate)

Imidan
(Phosmet)

Carbamates	Sevin (carbaryl)

* = restricted use pesticide

Acetylcholinesterase

- an enzyme essential to proper function of the nervous system
- Organophosphate insecticides inhibit its function, leading to nervous system toxicity

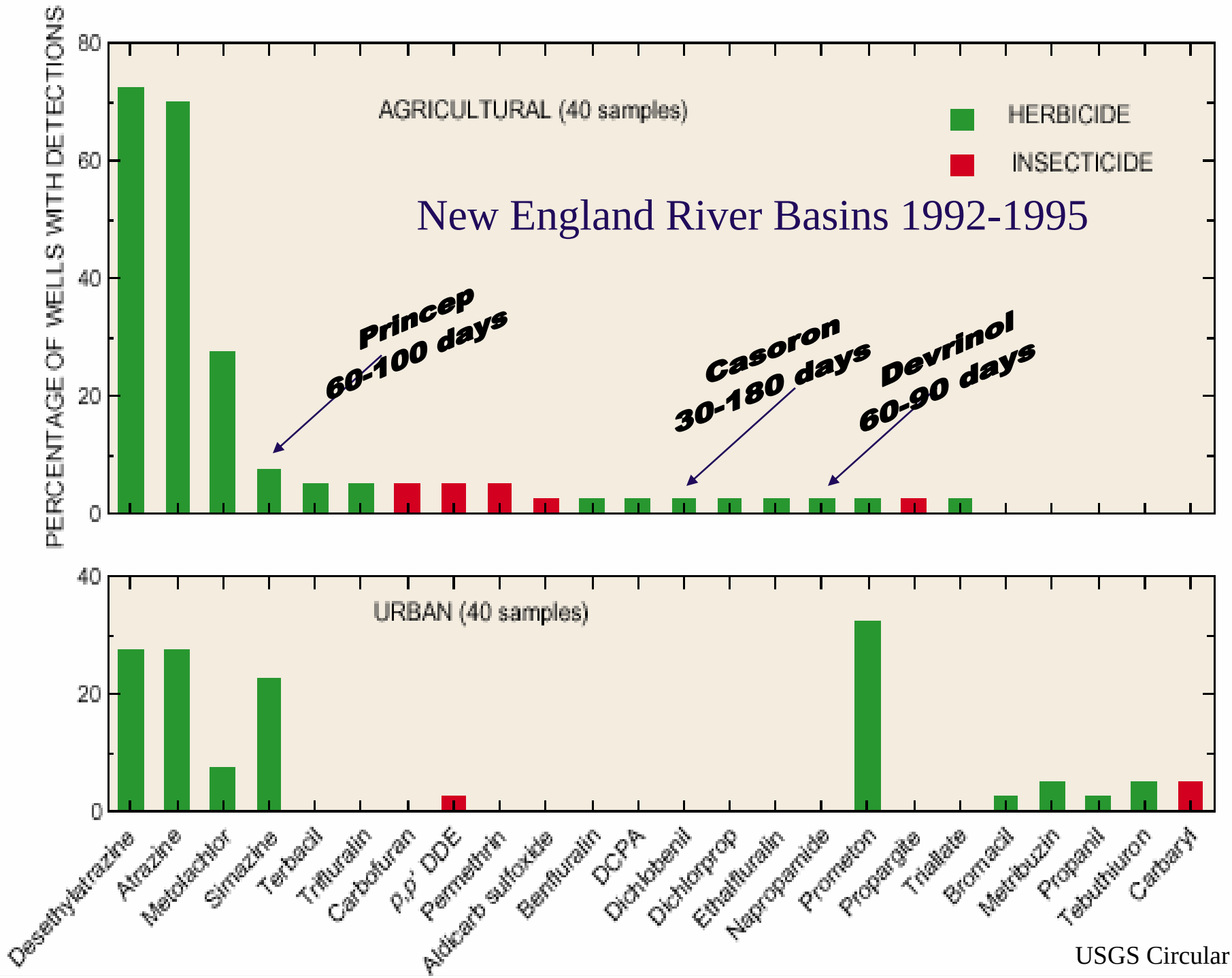
- Repeated exposure to the same OP or to different OP's can result in additive toxicity

Half Lives

- Half life of a chemical is the time that it takes for half of the original concentration applied to be degraded
- Chemicals behave differently
- Environmental conditions affect breakdown
- Soil and water half lives differ

Major Differences

- Organochlorines – DDT, Dieldrin
  - Years and years and years
- Organophosphates – OP's =
  - Lorsban, Orthene, Diazinon, Imidan
  - Days and days and days
- Herbicides?
  - Months
- Other new compounds?
  - Months



USGS Circular 1155

Organochlorines

- DDT, Dieldrin
  - Last for years and years and years
  - Banned in 1972
  - Half life is 10-30 years

Exposure of wildlife over an extended period of time to pesticide levels not immediately lethal may result in chronic poisoning. The most well-known example of a chronic effect in wildlife is that of the organochlorine insecticide DDT (via the metabolite DDE) on reproduction in certain birds of prey.

Since DDT is gone in the US, reproduction in birds such as the bald eagle has greatly improved.

Organophosphate Half Lives

	water	soil
Lorsban	7-30 days	30 days
Orthene	7-10 days	3 days
Sevin	6-7 days	10 days
Diazinon	14-21 days	40 days

Newer Compounds

- More stringent rules
- Longer residuals
- Intrepid (methoxyfenozide)
  - 77 days to 363 days
- Admire (Imidacloprid)
  - 48 to 190 days, 229 in the field
- Actara
  - 385 days in soil

New Homes and Neighbors

- People have a sense that where ever there are cranberry bogs there are pesticides (in the soil, in the wells, in the water)
- DDT should not be an issue
- OP’s could be
- Newer compounds may be

Water and Soil Testing

- PPM or PPB or PPT, very low detectable limits now
- OP's should not appear in water or soil tests unless they were recently applied (in the last month)
- Recent MDAR testing detecting Diazinon
- Town testing detected Intrepid in water sample
- BAM (casoron breakdown material) may show up in bog soils, near outflow flumes, and possibly in nearby wells but at such low levels there is no health concern

Neighbors

- Educate your neighbors
- Explain what you are doing
- Warn when OP’s are going on
- Encourage communication
- Hold your water